SHELL Research Chair

A Contribution to Biodiversity and Environmental Conservation in Sarawak

Editors
Andrew Alek Tuen
Gabriel Tonga Noweg
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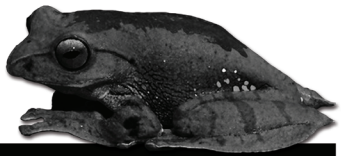

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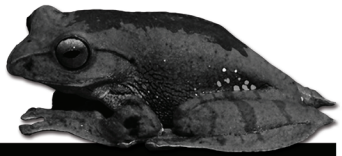

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CONTENTS

Coastal habitats in Santubong are important for biodiversity and economic activities such as eco-tourism and fisheries

ACKNOWLEDGMENTS

First and foremost, the contribution of Shell Malaysia towards conserving biodiversity and environment in Sarawak through fund donation is highly acknowledged. Acknowledgment also goes to Shell Research Chair Technical Committee, Shell Trustee (formerly known as Stakeholder) Committee and UNIMAS Research Committee who were innovative enough in making Shell Research Chair a successful grant provider in Universiti Malaysia Sarawak.

Many thanks to grant recipients who has remained committed in their research endeavour, and contributed sustainably to knowledge of biodiversity and environment from various perspectives.

The administration of Shell Research Chair has not been smooth without the proactive support from former and current IBEC staff. They have been actively involved in managing the Chair's account, acquisition of research equipment and materials, and assisting in arrangement of research activities including meetings, field works, conferences and conservation awareness programmes. We are grateful to them: Alexander K Sayok, Chaplin Iba, Cindy Peter, Felicia Anthony Reyap, Hailman Bawi, Hamady Dieng, Indraneil Das, Ketty Daun, Lau Seng, Mazrina Waty Adan, Mohammad Yazis Abdul Kadir, Meri Sabas, Mohd Hasri Al-Hafiz Haba, Pasey Lisus, Rahah Mohd Yakup, Sauyah Su'aut, Sendi Tangan and Sulaiman Bol.

Tapang tree, *Koompassia excelsia* at Gunung Jagoi is important in sustaining population of wild honey bees

MESSAGE

Research is one of the core business of Universiti Malaysia Sarawak. The university has always emphasize research that are related with current issues and needs, whilst recognising the importance of fundamental fields. Accordingly, UNIMAS has setup Research Innovation and Enterprise Centre (formaly know as Research and Innovation Management Centre), a unit that manages the overall research activities by the university. UNIMAS has also clustered its research programmes into three niche areas (i) Biodiversity and Environmental Conservation, (ii) Sustainability Community Transformation, (iii) Information, Communication and Creative Technology, taking advantage of the strategic location, abundant resources and the desires of the Government of Sarawak. In order to support and sustain the research activities, the university has adopted some strategies, among others by establishing Research Chair. Currently, seven research chairs had been established in the university, where Shell Research Chair is the pioneer and successful one.

Having seen the continuous supports from Shell, I must thank them for being the pioneer in awarding substantial amount of fund to support research by UNIMAS, particularly on Environmental Sciences under the Shell Research Chair. I would also like to highlight the current collaboration between Shell and UNIMAS on product research and talent development, with Momerandum of Understanding signed on 28th March 2016. In this respect, I would like to congratulate IBEC for presenting in a simple way all of the research and related activities funded by Shell. I believe this coffee table book will not only serve as reference per say, but it will also be a momento in recognising the corporate social responsibility of Shell. I do hope collaboratiions between Shell and UNIMAS will prosper in the years to come as we work together towards conserving biodiversity and environment in Sarawak.

Prof Datuk Dr Mohamad Kadim bin Suaidi
Vice Chancellor
Universiti Malaysia Sarawak

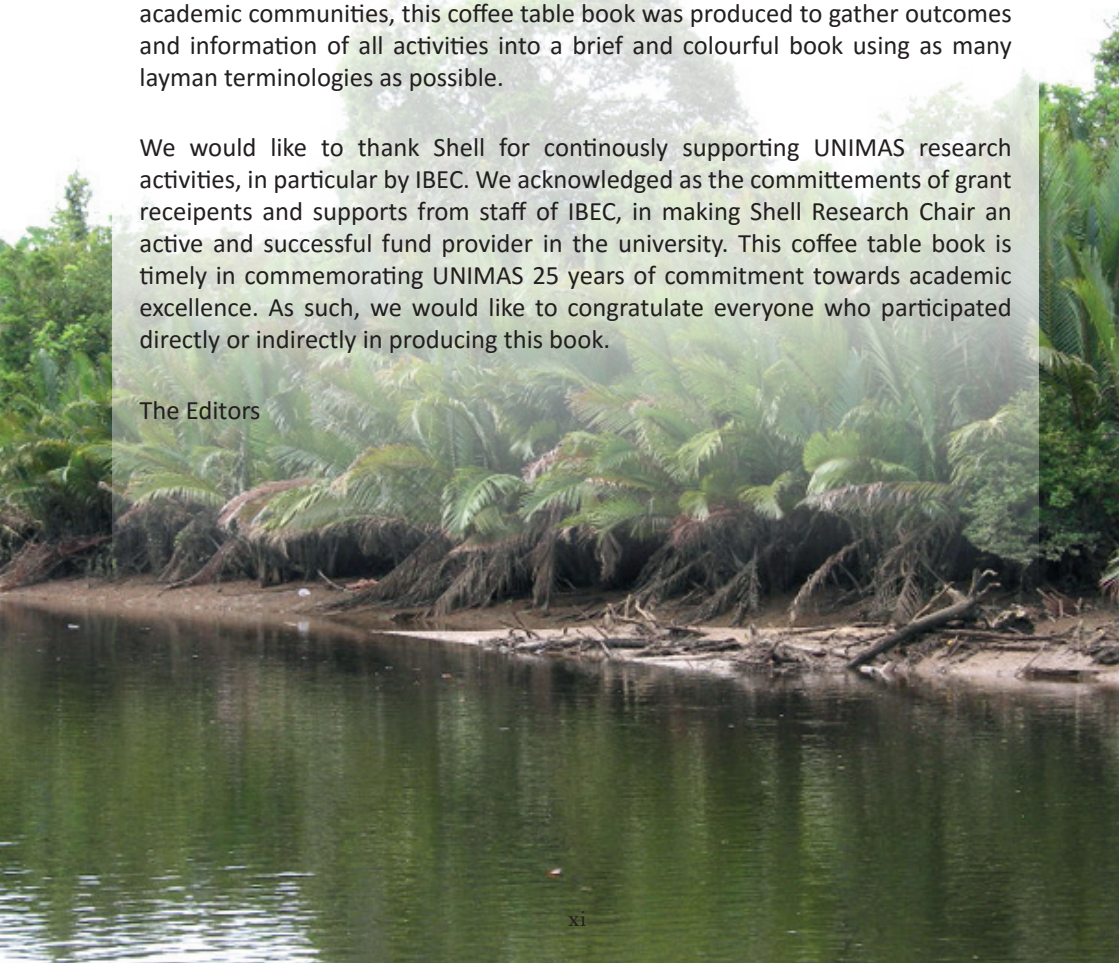
Fiddler crab, *Uca vocans*, regarded as the “engineer” of mangrove forest that determine the health of the ecosystem

PREFACE

Since it's establishment in 1995, Shell Research Chair has supported research activities from various perspective related to biodiversity and environmental sciences. This book presents ten research activities that had completed under the Chair between 2007 and 2018. The research activities encompasses a wide range of topics include fundamental studies on biodiversity (marine harmful algae, macroinvertebrates, fishes, amphibians, reptiles, birds and small mammals), ecological study of rivers and lakes, and its biodiversity, and assessment of tarballs characteristics associated with oil industry. The Chair has also supported conservation awareness programmes such as *International Frog Race*, *Dolphins Conservation in Sarawak* and *Hornbills Monitoring in Piasau Nature Reserve*. Outcomes of these activities have been published in various forms including paper in journals, conference proceedings, and books. As those materials are scattered and scientific publications suit more the requirement of academic communities, this coffee table book was produced to gather outcomes and information of all activities into a brief and colourful book using as many layman terminologies as possible.

We would like to thank Shell for continously supporting UNIMAS research activities, in particular by IBEC. We acknowledged as the committements of grant receipents and supports from staff of IBEC, in making Shell Research Chair an active and successful fund provider in the university. This coffee table book is timely in commemorating UNIMAS 25 years of commitment towards academic excellence. As such, we would like to congratulate everyone who participated directly or indirectly in producing this book.

The Editors



White-breasted Water-hen, *Amaurornis phoenicurus*, is common in open forests, marshes and even oil palm plantation.

INTRODUCTION

Established in July 1994, the Institute of Biodiversity and Environmental Conservation is one of the founding research institutes in Universiti Malaysia Sarawak. Its core business is promoting research in niche areas of Tropical Biodiversity and Environmental Conservation. In order to run its research activities efficiently, the management of IBEC had sought funds from potential private sectors among others Shell Malaysia, Sime Darby, Malaysian Palm Oil Board and Sarawak Energy Bhd. In 1995, Shell Malaysia in Miri awarded MYR2 millions to support research activities in IBEC with the theme of Research in Environmental Sciences. The research fund is regularised under the Shell Research Chair.

The goal of Shell Research Chair is to promote and encourage research on wide ranging environmental issues, including pollution of ecosystems, resource management, sustainable development, and environmental assessment and conservation strategies. The Chair is administrated by Shell Research Chair Technical Committee (day to day administration in IBEC, and make recommendation to Trustee Committee) and Shell Trustee Committee (endorsement and advisory). The administrative committee have applied strategies to achieve the Chair's goal by appointing Research Fellows, and awarding Research Grants. Since year 2007, four research fellows had been appointed on contract basis. A total of 10 research grants amounting MYR279 495 had awarded to applicants covering wide range of research niches. The findings of the projects are being presented in this coffee table book.

In the last ten years, the administrative committee found that supporting other related activities such as scientific expeditions, publications, seminars and workshops, training and public awareness programme were also useful approaches to achieve the Chair's goal. Such activities also serve to publicize the indirect contribution of Shell to the society. The performance of the Chair has been monitored through reports and meetings. The objective of this book is to dissiminate the information obtained from the project to the publics.

View of mudflat Santubong River estuary
from the top of Mt. Santubong

Habitat Use by Waterbirds at Asajaya, Kota Samarahan

Mustafa Abdul Rahman and Andrew Alek Tuen

Bako-Buntal Important Bird Area which include Asajaya is known for it huge area of mudflat that serves as crucial foraging habitat for waterbirds include migtarory species. This study focuses on foraging ecology, distribution patterns, migration route and phylogenetic relationships of the shorebirds at Asajaya, Kota Samarahan. This project, SRC/01/2007/01 was conducted between 2007 and 2011. Specific objectives of the study are;

1. To determine the effect of human activity on the distribution and abundance of food resources and how these affect the distribution and abundance of shorebirds.
2. To determine which species of shorebirds use wetland habitats further inland such as aquaculture ponds and padi fields.
3. To study the relative value of aquaculture ponds, irrigation ditches, river banks and padi fields, compared to tidal flats, as alternative habitats for waterbirds.
4. To determine the phylogenetic relationship among family members of the family Scolopacidae.
5. To quantify genetic differences between species in the family Scolopacidae.
6. To compare the taxonomic classification of the family Scolopacidae using morphological and genetic markers.

The key findings and outputs of the study include,

1. Data on diversity, migration route and foraging ecology of shorebirds at Asajaya.
2. A total of 30,311 counts of waterbirds comprising 33 species and four families recorded from the tidal flats of Asajaya.
3. A total of 1,026 birds were counted from inland habitats, comprising 827 counts from ponds, 177 counts from open spaces, and 22 counts from padi fields.
4. The study shows mudflat contain four classes of benthic communities consisting of 15 morphospecies that serve as food source for waterbirds.
5. Ecological knowledge on relationships between shorebird communities and habitats.
6. Completion of one master student thesis.
7. Providing useful data for conservation and eco-tourism programme in Bako-Buntal Important Bird Area.

The information of the study was presented in conference and student thesis.

1. Razak NAA (2014). Distribution patterns, migration route and phylogenetic relationship of Waders (Aves: Scolopacidae) in Sarawak, Malaysian Borneo. *MSc thesis*.
2. Razak NAA, Tuen AA & Rahman MA (2011). Phylogenetic relationships of waders (Aves: Scolopacidae) in Sarawak inferred from partial mitochondrial DNA (mtDNA) Cytochrome Oxidase I (COI) gene. (9th MGC 2011).
3. Imat A (2006). Foraging ecology of shorebirds at Buntal and Sambir, Sarawak. *BSc thesis*.

Great Egret, *Egretta alba* is a migrant species commonly found in wetland habitats

Buntal Esplanade is one of popular venues for annual bird watching

Yellow-vented Bulbul, *Pycnonotus goiavier*, among the commonest garden birds

Cinnamon Bittern, *Ixobrychus cinnamomeus*, often found in open grassland

Sg. Rayu flow through Matang Wildlife Centre in the upstream and passing agricultural land and settlement at the downstream

Riverine Fauna in Rayu River System, Kuching

Jongkar Grinang, Lee Nyanti and Andrew Alek Tuen

This is solely a fundamental research that provides baseline information on the fauna and water quality of Rambungan Mangrove in Kuching Division. Some useful baseline data such as species diversity of fish, decapod crustacean, bird and mammal were recorded. The riverine fauna of Rayu River System comprise 65 species of fishes in 34 families, 16 species of crabs (6 families), 13 species of prawns/shrimps (3 families), 4 species of reptiles and frog, three species of mammals, and 32 species of birds (21 families). Some of the species are protected under the Sarawak Wild Life Protection Ordinance 1998. This is the first record of the fauna from Rambungan Mangrove area and downstream of Rayu River system. Some previous studies had focused on upstream of Rayu River, inside the Kubah National Park and Matang Wildlife Centre. Therefore, the current data are important to add to the existing information on biodiversity in the entire area. This project, SRC/01/2007/02 was conducted between 2007 and 2011. The key outputs of the study are,

1. Baseline data of fishes, decapod crustaceans, birds and mammals from Rambungan Mangrove area and downstream of Rayu River system.
2. Completion of three undergraduate student's projects.
3. Providing useful data for conservation and management of Rambungan Mangrove area.

Other useful information obtained from the study includes the water quality of Rambungan Mangrove area, and the potential threats to the mangrove forest and the fauna. Several water parameters, which are correlated with land use were identified as potential threats in influencing species diversity and distribution of aquatic fauna in the area. Small-scale fisheries and eco-tourism potential in the area were also highlighted in the publication materials.

The information obtained from the study was presented in conference proceedings and undergraduate theses. The information are available for reference from the faculty depository.

1. Grinang J, Nyanti L, Hassan N, Jalim NA, Seleman H & Moktar N (2009). Fishes and decapod crustaceans of Kuching Mangrove Areas, Sarawak, presented in the *International Conference on Marine Ecosystem 2009*, 26-28 May 2009, Awana Porto Malai, Langkawi, Kedah, Malaysia.
2. Grinang J, Nyanti L, Moktar N, Abdul Jabbar S & Jalim NA (2008). Fish and crustacean of Rambungan Mangrove Forest in Sarawak: diversity, fisheries and eco-tourism perspectives, presented in the *National Seminar on Biodiversity Conservation for Ecotourism, Timber Resource and Species Protection*, 20-21 August 2008, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.
3. Moktar N (2008). Composition and diversity of fish fauna in Rambungan Mangrove area. Faculty of Resource Science and Technology, Universiti Malaysia Sarawak. *BSc thesis*.
4. Abdul Jabbar S (2008). Fisheries at Rambungan Mangrove area. Faculty of Resource Science and Technology, Universiti Malaysia Sarawak. *BSc thesis*.
5. Jalim NA (2008). Water quality study in Rambungan Mangrove area. Faculty of Resource Science and Technology, Universiti Malaysia Sarawak. *BSc thesis*.